14014905-3 Special Topics I

Homework 04: Due date: Sun 28/3/2021 @ 11:30pm

1- Write a predicate named **decrease/1** that takes one argument: **StartFrom** and prints out a sequence of number in descending order starting from any given positive, integer number to **0**.

Example: (**decrease.pl**)

```
?- decrease(10).

10 9 8 7 6 5 4 3 2 1 0
```

2- Write a predicate named **increase/2** that takes two arguments: **StartFrom**, **EndAt**, and prints out a sequence of number in ascending order between any two given positive, integer numbers.

Example: (**increase.pl**)

```
?- increase(5, 15).

5 6 7 8 9 10 11 12 13 14 15
```

3- Write a predicate named **area_of_circle/1** that takes one argument: **Radius** and calculates the area of the circle: $A = R^2 * 3.14$

Example: (**circle.pl**)

```
?- area_of_circle(3).

The area is 28.26
```

4- Write a predicate named **sum/2** that takes two arguments: **FNum**, **SNum**, and prints out the sum of numbers between any two given positive, integer numbers.

Example: (**sum.pl**)

```
?- sum(5, 10).

The sum is 45
```

5- Write a Prolog program that contains two predicates named **to_celsius/1** and **to_fahrenheit/1**. The former predicate converts a *Fahrenheit* degree to *Celsius* using: `Celsius = (5/9)Fahrenheit – 32`. The later predicate converts a *Celsius* degree to *Fahrenheit* using: `Fahrenheit = (9/5)Celsius + 32`

Example: (**temperature.pl**)

```
?- to_celsius(32).
The Celsius Degree is: 0

?- to_fahrenheit(0).
The Fahrenheit Degree is: 32
```

6- Write a Prolog predicate **in_circle/2** that takes two arguments **X**, **Y**, and tests if a given point with coordinates (X, Y) is inside a circle centered at (0, 0) and with radius of 10. Note that a given point is inside a circle if its distance to the center **(0, 0)** is less than or equal to **10**.

Example: (**point_in_circle.pl**)

```
?- in_circle(4, 5).
The point is inside the circle

?- in_circle(9, 9).
The point is outside the circle
```

Submission Instructions:

You may work as a team on this homework. The homework must be submitted via the **Blackboard** system. A Dropbox folder named **Homework04** is created in the system for submitting your homework. Late submission will not be accepted. You are requested to submit the source code files (**.pl**) of all the requested Prolog programs. Please provide the following information in the top of each source code file:

- The names and IDs of the group members.
- The group ID.
- Date of submission.
- Brief description of the program

Also, you need to submit **a single PDF file** that contains snapshots of the output results of each Prolog program. Please try to provide clear snapshots. Include the group information on the first page.

It is recommended to submit only **ONE compressed file** that contains all the source code files along with the PDF file. You must name this file as follows: Homework04_G??_???? (G?? is the group ID and ???? is the group leader ID). For example, **Homework04_G03_12345678**. This file must be submitted **ONLY** by the group leader.